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Electronic Communication Among Anesthesia Providers

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ELECTRONIC COMMUNICATION AMONG ANESTHESIA PROVIDERS

by

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ABSTRACT

ELECTRONIC COMMUNICATION AMONG ANESTHESIA PROVIDERS

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Facilities in the United States are utilizing electronic communication devices (ECDs) for their nursing staff on intensive care units, general medical-surgical floors, and chemotherapy floors, but it is underutilized in the operating room where seconds truly matter (Wu et al., 2012). Situations arise daily within operating rooms that require quick and decisive communication to avoid poor patient outcomes. The ultimate goal is to prevent poor patient outcomes by enhancing communication among anesthesia providers.

This nursing capstone project evaluated an anesthesia group in southeast Mississippi regarding their satisfaction with current devices used for communication. This anesthesia group utilized smart phones and public announcement systems. Surveys were administered to the anesthesia providers resulting in 33 participants answering five questions regarding current practice and their willingness to accept a practice change. Results showed that 54.5% of participants were satisfied with the current level of communication among anesthesia providers. Additional results showed that 85% of participants were willing to accept new information regarding the advances in electronic communication as well as 79% willing to accept a practice change.

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DEDICATION

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
CRNA	Certified Registered Nurse Anesthetist
ECD	Electronic Communication Device
IT	Information Technology
IRB	Institutional Review Board
PACU	Post-anesthesia Care Unit
SRNA	Student Registered Nurse Anesthetist

CHAPTER I - INTRODUCTION

Time is of the essence within the operating room, and fast and simple communication among anesthesiologists and certified registered nurse anesthetists (CRNAs) can greatly affect patient safety. Quick and decisive communication is important and improving the clarity and speed of communication leads to better patient outcomes (Wu et al., 2012). There are multiple studies outlining the importance and effectiveness of communication within healthcare. In a recent mixed-methods study (de Grood et al. 2012), researchers found that 81% of healthcare members felt that after implementing electronic communication devices (ECDs) they spent less time finding their co-workers. The implementation of ECDs led to an improvement in staff efficiency and communication that ultimately improved the quality of patient care. For the purpose of this nursing capstone project, ECDs will include hands free communication devices (including Vocera® and walkie-talkies).

Anesthesia requires collaboration among CRNAs and anesthesiologists. Proper collaboration increases speed and efficiency and decreases risks inherent for the patient during surgery. The ultimate goal of healthcare is to improve the health and wellbeing of patients. The same goes for the practice of anesthesia; the wellbeing of patients is of the utmost importance. Effective collaboration and communication among anesthesia providers places the patient's health at the center of any procedure.

Clinical Question (PICO)

Are the clinicians of the anesthesia group satisfied with the current level of communication among anesthesia providers; are they willing to be informed of the advances in electronic communication and are they willing to accept a practice change?

Needs Assessment

A scenario presented itself during the researcher's education that caused him to select ECDs as the focus of his research. An emergency occurred during an inguinal hernia repair. The patient was in his late 50's, healthy with his only disease process being hypertension. Near the end of the procedure the patient began to experience rapid bradycardia and within 15 seconds progressed to asystole. The facility where this event took place utilized cell phones and a PA system to communicate among anesthesia providers. The circulating nurse was sent from the operating room to find the supervising anesthesiologists and additional anesthesia providers. It took minutes to receive support whereas evidence has shown that ECDs reduce response times from minutes to seconds. Had additional help been available sooner, it is possible the patient would not have been without a pulse for 25 minutes. The patient spent the evening in the intensive care unit and upon recovery lost only his ability to recall events for that day. This emergency had no lasting impact on the patient but there are many scenarios in which that is not the case.

Another scenario presented itself to the researcher during his education that caused him to miss out on a learning experience. The facility where this took place only utilized cellular devices to communicate among anesthesia providers. The supervising anesthesiologist was searching for the researcher to perform a neuraxial nerve block. The anesthesia provider was unable to find the researcher because he had been given a separate task by a different anesthesia provider. It took the supervising anesthesiologist 30 minutes to locate the researcher. Had this facility utilized ECDs, then the time to locate the researcher would have been drastically reduced as evidenced by the following literature review.

If adding ECDs proves supportive rather than a hindrance, and improves patient outcomes by increasing patient safety, then the addition of this type of communication should be considered. If enhancing communication among anesthesia providers improves patient outcomes, then all operating rooms should consider implementing this technology.

Background

Patient safety is paramount to anesthesia practice. Great strides have been taken to decrease patient mortality and morbidity throughout the history of anesthesia. Due to these measures, anesthesia is one of the safest disciplines in healthcare (Novak, n.d.). The Committee on Quality of Health Care in America (1999) stated that mortality rates of anesthesia have dramatically decreased from one death per 5,000 cases in the 1980s, to one death per 250,000 – 300,000 cases in 1999 (Kohn, Corrigan, & Donaldson, 2000). According to this research, anesthesia is now 50 times safer today than it was in the 1980s. However, the American Association of Nurse Anesthetists and the American Society of Anesthesiologists continue to make changes to improve the quality of care and increase patient safety. The Centers for Disease Control and Prevention (CDC) in the early 1990s wanted to conduct research on the mortality and morbidity rates in anesthesia. However, the CDC found that mortality and morbidity rates within anesthesia were too low to consider conducting such a time consuming and expensive endeavor. Accordingly, patient mortality numbers regarding anesthesia at the local and regional level are non-existent due to the low mortality rates nationwide, removing the need for such data.

Significance of the Problem

Hospitals across the nation are currently utilizing ECDs for their nursing staff on chemotherapy floors, general medical-surgical floors, or intensive care units, but it is underutilized in the operating room where seconds truly matter (Wu et al., 2012). There are situations in operating rooms where being able to contact help quickly during critical situations improves patient outcomes. The inability to communicate from one anesthesia provider to another can cause a delay in support, leading to poor patient outcomes. The intention of this nursing capstone project is to remove elements of non-communication from one anesthesia provider to the other.

Conceptual Framework

Imogene King's Theory of Goal Attainment (King, 1992) was applied as the theoretical framework for this nursing capstone project. As the name of the theory suggests, the ultimate outcome is goal attainment. King's theory arose from her previously developed conceptual framework; the framework revolved around a sense of completeness and relied upon the process of nursing. The process results in important transactions that conclude with goal attainment (King, 1992).

Several assumptions exist within King's theory, and the most important regarding this nursing capstone project included: individuals are rational, social, time-oriented, and action-oriented. The concepts applied to King's theory included: perception, space, stress, time, transaction, role, interaction, communication, and growth and development. King's theory proposed multiple outcomes that suggest if goals are attained, effective nursing care and satisfaction will occur. King's theory culminated with multiple hypotheses, most of which revolve around nurse and client interaction. However, since

this nursing capstone project revolves around communication among anesthesia providers the most relevant hypothesis was that achieved goals lead to less stress and anxiety in nursing situations (Butts & Rich, 2015).

Application of Theory

For the purpose of this nursing capstone project, the goal was to increase patient safety through provider communication. Research evidence supports the use of ECDs, which reduce response time from anesthesia providers when assistance was required. King's theory incorporates many important aspects of this nursing capstone project including time, transaction, interaction, and communication, and provided a valuable framework for the attainment of increased patient safety (Butts & Rich, 2015).

Doctor of Nursing Essentials

There are eight essentials of doctoral education for advanced nursing practice. This nursing capstone project meets all eight essentials, which is covered in Appendix B. However, essential IV and VI are of the most significance for this project. Essential IV pertains to information systems/technology and patient care technology for the improvement and transformation of health care. This nursing capstone project focused upon the use of electronic communication in order to increase speed and efficiency for anesthesia providers and in turn results in an improvement in health care. Essential VI address the need for advanced practice nurses to collaborate interprofessionally in an effort to improve patient and population health outcomes. This nursing capstone project aimed to improve communication between anesthesiologists, CRNAs, and SRNAs or an interprofessional group of individuals (American Association of Colleges of Nursing, 2006).

CHAPTER II – REVIEW OF LITERATURE

Search Methods

A comprehensive search through multiple online databases resulted in articles gathered from multiple sources written for nursing, technology, and anesthesia. Databases included Google Scholar, CINAHL with Full-Text, PubMed, and MEDLINE. Keywords included *electronic communication, operating room, surgery, anesthesia, hands free communication devices,* and *nursing*. Searching these databases resulted in 33,927 articles found. Of the 33,927 articles, 29,500 articles were found through Google Scholar. If the authors discussed ECDs effects on healthcare delivery and were peered reviewed, then it was considered for inclusion into this evidence review. This narrowed the results to 16 articles. Of the 16 articles, ten articles discussed alphanumeric pagers, mobile phones, smartphones, and task management system use. These ten articles were excluded from the evidence review since they did not specifically cover the effects of ECDs on communication. The remaining six articles were chosen for the evidence review.

Key Concepts

Richardson and Ash (2008, 2009) and Richardson, Shah-Hosseini Fiadjoe, Ash, and Rehman (2010) are the predominant authors on the subject of ECDs in healthcare and have conducted multiple qualitative studies. They conducted their research at an academic medical center and a community hospital. Each article builds upon the next and adds new elements or themes. Some themes include communication access, control, training, organizational change, environment, and infrastructure. These themes have been identified to inform readers of the barriers to the implementation of ECDs and

therefore were applied to the key concept of obstacles. Other researchers address the impact that ECDs have upon healthcare by conducting qualitative and quantitative research focusing upon improving response times and improving efficiency. These articles fall into the concept of speed and efficiency.

Obstacles

Richardson and Ash's (2008) first study was qualitative, utilizing grounded theory methodology in order to understand how ECDs affect healthcare communication. They set out to answer three questions: how ECDs affect nurse, nurse manager, and informational technology (IT) staff communication, how ECDs affect communication in the health care organization, and what the unintended consequences are. The authors answer these questions through 26 semi-structured interview questions and 3 observations. The participants (N = 26) interviewed were of technical and administrative IT staff, staff nurses, and nurse managers from an intensive care unit or operating room.

The data resulted in the creation of two major themes: communication access and control. Communication access deals with staff being able to communicate with each other, without interference. Several subthemes, which include finding a phone, locating a person, obtaining help, streamlining, immediacy, directness, and dependence, exist within the overarching major theme of communication access. Control is broken down into two minor themes that include social control and technical control. Social control consists of four subthemes: interruptions, patient confidentiality, conflicting communications, and etiquette. Technical control consists of two subthemes that include speech recognition and ease of use (Richardson & Ash, 2008).

In conclusion, all participants felt that ECDs improved communication access. However, the nursing staff expressed issues with the system that the IT personnel did not. The issues the nursing staff experienced revolves around maintaining control over the number, timing, and proper use of ECDs. The conclusion is that the staff had become dependent upon ECDs and did not want to work without them (Richardson & Ash, 2008

Richardson and Ash (2009) conducted another study to analyze the effects of ECDs on healthcare from several different perspectives. The authors asked 26 individuals from three target groups to participate in interviews and observations. In total, there were 23 face-to-face interviews and three telephone interviews.

Richardson and Ash (2009) conducted the observations, and each observation lasted between one to two hours. The information was coded using NVivo 7.0 (Richardson & Ash, 2009), a qualitative data management tool. Richardson and Ash (2009) then inspected the coding to ensure the validity of the coding scheme. Next, the authors organized the data into themes and subthemes (Richardson & Ash, 2009).

Five themes emerged including communication access, control, training, organizational change, and environment and infrastructure. In a previously published article from 2008, Richardson and Ash (2008) identified the themes of communication access and control. Information regarding these two themes existed previously within this literature review. Training, one of the three remaining themes, arose due to participants expressing a desire for proper training on the use of ECDs. The participants felt that proper training might minimize many of the challenges they had experienced using ECDs. Organizational change developed from the impact that ECDs have upon patient care and organizational strategies. The final theme environment and

infrastructure appeared because of the constraints the physical layouts created when attempting to use ECDs.

The authors concluded that ECDs can improve communication access and that new users can easily understand the systems. They listed possible negatives, which include interruptions, unresolved etiquette, privacy concerns, and conflicting communication channels, but explained that proper training minimizes these issues (Richardson & Ash, 2009).

Richardson et al. (2010) conducted a qualitative study to investigate how ECD systems effect communication within a 15 room pediatric surgical suite. They included 10 anesthesiologists, four CRNAs, two circulating nurses, a charge nurse, and a postanesthesia care unit (PACU) nurse. The 18 staff members included in the study were selected from a pool of 90 employees.

Semi-structured interviews ranging from eight to 38 minutes were conducted with each participant. Richardson et al. (2010) observed and recorded one anesthesiologist and one CRNA for two hours while they wore ECDs. The semi-structured interviews, Richardson's observation notes, and daily journals kept by the participants were transcribed into 115 pages of data. Richardson et al. (2010) then used a constant comparative method to analyze and compare the data with themes that had been previously developed. These previously identified themes included communication access, control, training, environment, and infrastructure (Richardson et al., 2010).

The results produced three new themes that include technical control, choosing communication channels, and reliability. Technical control describes issues and concerns regarding participants and their technical ability to manage the use of ECDs. The theme

of choosing communication channels focuses on the participant's awareness of the urgency of the message that he or she needs to send and the recipient's availability. Reliability revolves around the ECDs working when needed during dangerous and life threatening situations. Estimations from the participants on how often the ECDs worked properly ranged from 30 to 100% of the time. The authors' discussion identified the staffs' desire to be interconnected but not to be interpreted, which reflects a communication-balancing act. Proper training and education would help to alleviate this issue (Richardson et al., 2010).

Speed and Efficiency

Another (de Grood et al., 2012) mixed-methods study sought to determine if healthcare providers' perceptions of ECDs align with claims that technology can improve patient safety and quality of care. The qualitative component of this mixed-methods study included a cross-sectional questionnaire sent to 105 nursing staff, allied healthcare professionals, and unit clerks who used ECDs in an acute-care inpatient unit. The response rate for the questionnaire was 57%. The authors analyzed the questionnaires in order to derive the predominant themes.

The authors discovered three major themes, which include improved work efficiency, improved quality of patient care, and improved team communication. For the quantitative portion of the study, the authors broke down the questionnaires into percentages. Three options existed for each question within the questionnaire allowing the participant to choose agree, disagree, or neither agree nor disagree to each individual question. The results show that 45% of the healthcare members felt that they were able to perform their tasks efficiently due to the implementation of the ECD.

The data show that 81% of healthcare members felt that after implementing ECDs they spent less time finding their co-workers. Finally, 27% of the participants felt they were able to spend more time with their patients due to the use of ECDs. In conclusion, the authors felt that their questions were answered and that ECDs benefit healthcare members by improving staff efficiency and communication, which ultimately improves the quality of patient care (de Grood et al., 2012).

Breslin, Greskovich, and Turisco (2004) conducted a mixed-methods study to determine the value of ECDs. The device being evaluated had been recently put into use at St. Agnes Healthcare, which is a 299 bed nonprofit hospital that serves the Washington, DC/Baltimore area. In May of 2003 St. Agnes Hospital installed the Vocera Communications System®. This system consisted of two components, the Vocera Communication® Badge and System Software. These two components allow the user to answer incoming calls while remaining hands-free, it gave the user the ability to call another party by title, group, function, or name, and the ability to call from the badge directly to phones outside and inside the hospital.

Two methods of data collection were used: a file was created within the Vocera server, which captured every call received and placed by Vocera® over a 4-day period. One unit secretary and three registered nurses were observed for the same 4 days. Surveys were also distributed on each nursing unit that used the Vocera® system and were asked to respond within one week.

Results showed a positive impact on communication from the use of Vocera®. The use of traditional communication methods, when compared to the use of Vocera®, resulted in one nursing unit saving a total of 3400 hours over a year that is comparable to

1.7 full-time employees. Furthermore, survey responses indicated that 15.8% of nurses working on a non-Vocera® floor felt that communications led to an efficient workflow in comparison to 79.2% on the Vocera® floor. The research also showed that nurse to nurse communication was at 2.67 minutes without Vocera® to 0.47 minutes with Vocera®.

The use of an ECD led to a visible improvement of workflow within St. Agnes Hospital. Vocera®, the device in question, initially cost the hospital for implementation and installment but ultimately saved the hospital in person-hours. The device also allowed the nurses to focus more on patient care than time spent locating co-workers.

Vandenkerhof, Hall, Wilson, Gay, and Duhn (2009) used a mixed-method design to assess the attitudes and perceptions of employees to the use of ECDs i.e. Vocera Communications®. The research was performed between April and June 2007 at a 456-bed acute care facility on a 38-bed general surgical unit. The study consisted of a focus group, which was asked to complete a paper-based survey prior to the implementation of the ECD and after, as well as a time and motion system to assess the ECD.

The survey was intended to capture the attitudes and perceptions of staff towards a new ECD. The researches focused on four psychological constructs: subjective norms, attitudes, behavioral intention, and perceived control. The time and motion system was put into place to document patterns and the time required communicating key activities. This system was used to assess these activities before and after the 4 weeks.

Of the staff members who were presented with questionnaires, 80% responded before the implementation of the ECD and 74% after the 4-week period. The respondents reported that the most significant advantage for implementing an ECD is saving time looking for things or people. This advantage increased from 57% to 97% of

respondents before and after the implementation of the ECD. Time spent on activities such as looking for the medication keys, looking for co-workers, and answering the telephone was decreased by 25% after the implementation of the ECD.

This study shows that ECDs improve efficiency in communication related activities. Staffs are able to immediately communicate with one another whether they are on or off the floor. The potential of ECD is an increase in patient safety and work environments.

Literature Discussion

Most surgical facilities in the immediate practice area do not utilize ECDs to communicate among anesthesia staff, however evidence indicates that ECDs improve healthcare within an operating room environment by enhancing workflow and increasing patient safety. ECDs are an effective way to communicate, but the possibility of patient information leaks is a major concern. If technology-based communication can improve patient outcomes within the operating room, it is imperative to explore the different communication options in detail. The purpose of this project is to determine why anesthesia providers do or do not utilize ECDs to communicate within operating rooms. Evidence exists that supports the use of ECDs in the operating room for anesthesia providers. However, in order to implement changes to current anesthesia practice one must first identify and adequately address barriers to the proposed change. The following methodology section details how the researcher went about reviewing the satisfaction of current devices used by anesthesia group one.

CHAPTER III - METHODOLOGY

The purpose of this nursing capstone project was to assess the willingness of anesthesia providers of an anesthesia group in southeast Mississippi to change their practice regarding ECDs. The providers surveyed practice at multiple locations. The providers utilized public announcement systems and smart phones as a means to communicate with one another to relay information and to request support. Research supports a practice change that incorporates more advanced electronic communication devices such as walkie-talkies, push to talk private 2-way radios, or Vocera® devices.

Population

Two anesthesia groups were included into this nursing capstone project. Anesthesia group one includes anesthesia providers who utilized smart phones and public announcements systems to communicate. Anesthesia group two includes anesthesia providers who utilized walkie-talkies to communicate. The population for this nursing capstone project consists of anesthesiologists, CRNAs, and SRNAs. Non-identifiable information from anesthesia providers at these two locations were included into the project through surveys. The goal was to present the survey via oral announcement to a minimum of 25 anesthesia providers up to a maximum of 50.

Inclusion Criteria

Any anesthesia providers who were approached and willing to participate were included. Individual anesthesia providers were invited to complete the survey via one on one interactions. Individuals were included regardless of gender, age, ethnicity, level of education, years of experience or provider type. Only full-time status employees were included due to their knowledge of current electronic communication devices being

utilized at these sites regardless of the time of day (on-call, weekend days and nights, etc).

Exclusion Criteria

Individuals were excluded if they were PRN (as needed) or part-time status employees. No other exclusion criteria was used. No compensation was given for participation in the survey.

Methods

A paper survey was handed to anesthesiologists and CRNAs who were willing to participate and were currently working for anesthesia group two. This survey was intended to discover the advantages and disadvantages of utilizing ECDs. The data gathered was applied to the information presented to the anesthesia group one regarding the proposed practice change. The survey is attached below as Appendix E.

An additional and separate paper survey was handed to anesthesiologists, CRNAs, and SRNAs who were willing to participate and currently working for anesthesia group one. This survey was intended to gather information regarding current communication devices and how the providers feel about the effectiveness of these devices. The survey was also designed to determine how willing these providers are to a proposed practice change regarding electronic communication. This survey is attached below as Appendix F.

All surveys were presented to the providers and collected by the researcher. The only personal information gathered from these individuals is whether they were an anesthesiologist, CRNA, or SRNA. All the surveys were kept inside a locked file

cabinet. Electronic information was stored on the researcher's personal password protected computer.

CHAPTER IV – ANALYSIS OF DATA

Two CRNAs were surveyed from anesthesia group two. In response to question one of the Anesthesia Group Two Survey from Appendix E each CRNA stated that they used the walkie-talkies or ECDs numerous times on a daily basis. In response to question two of the Anesthesia Group Two Survey each CRNA stated that ease of use and immediate communication were advantages to the utilization of walkie-talkies. The answers for question three of the Anesthesia Group Two Survey differed as one CRNA explained that reliability has been an issue at times whereas the other CRNA stated that miscommunication could be an issue. Neither CRNA was able to list a specific scenario in response to question four of the Anesthesia Group Two Survey but stated that they feel comfortable claiming that the walkie-talkies have prevented poor patient outcomes through communication. In response to question five of the survey, both CRNAs could not think of a scenario in which the walkie-talkies led to patient harm. For the final question of the survey, both CRNAs recommended the use of walkie-talkies for anesthesia communication.

The Anesthesia Group One Survey was presented to a total of 33 anesthesia providers. Of the 33 anesthesia providers; 4 were anesthesiologists, 10 were CRNAs, and 19 were SRNAs. The Anesthesia Group One Survey is attached as Appendix F but as a reference to the tables listed below, the following questions were asked.

Question 1: Are you satisfied with the current level of communication between anesthesia provider?

Question 2: Are the current devices reliable?

Question 3: Do you feel that the use of smart phones and public announcement systems provide an efficient way to communicate among anesthesia providers?

Question 4: Would you be willing to listen to information regarding advances in electronic communication?

Question 5: Would you be willing to accept a practice change?

Table 1

Anesthesia Group One Survey SRNA Response

	Yes	No	Unsure
Question 1	4 (21%)	15 (79%)	/
Question 2	4 (21%)	15 (79%)	/
Question 3	9 (47%)	9 (47%)	1 (6%)
Question 4	19 (100%)	/	/
Question 5	19 (100%)	/	/

Table 2

Anesthesia Group One Survey CRNA Response

	Yes	No	Unsure
Question 1	10 (100%)	/	/
Question 2	10 (100%)	/	/
Question 3	10 (100%)	/	/
Question 4	7 (70%)	3 (30%)	/
Question 5	5 (50%)	3 (30%)	2 (20%)

Table 3

Anesthesia Group One Survey Anesthesiologist Response

	Yes	No	Unsure
Question 1	4 (100%)	/	/
Question 2	4 (100%)	/	/
Question 3	4 (100%)	/	/
Question 4	2 (50%)	2 (50%)	/
Question 5	2 (50%)	/	2 (50%)

Table 4

Anesthesia Group One Survey Total Response

	Yes	No	Unsure
Question 1	18 (54.5%)	15 (45.5%)	/
Question 2	18 (54.5%)	15 (45.5%	/
Question 3	23 (70%)	9 (27%)	1 (3%)
Question 4	28 (85%)	5 (15%)	/
Question 5	26 (79%)	3 (9%)	4 (12%)

Discussion of Results

While interpreting these results it is important to keep in mind the disparity between providers. The participants were 58% SRNA, 30% CRNA, and 12% anesthesiologist. Looking at the tables it is clear that the SRNAs (79%) were not satisfied with the current level of communication whereas the CRNAs (100%) and anesthesiologists (100%) are satisfied. The same can be said for the reliability of the current devices used for communication, where the SRNAs (79%) feel that they are not reliable and the CRNAs (100%) and anesthesiologists (100%) view them as reliable. The majority of participants felt that smart phones and public announcement systems provided an efficient way to communicate with a total of 70% of the participants answering yes to question three. Most participants were willing to listen to information regarding advances in electronic communication and were willing to accept a practice change with 85% and 79% answering yes to questions four and five respectively.

Further analysis of responses to question one reveals that SRNAs were not satisfied with the current level of communication between anesthesia providers because they have been removed from the communication loop. Policy for anesthesia group one stated that students were not allowed a cellular device within the operating room.

Regardless, it was clear that some SRNAs were utilizing cellular devices in order to communicate with their preceptor. These SRNAs were reporting that their personal cellular devices were not reliable due to unreliable cellular service. Additionally, one CRNA made a comment about cellular service being unreliable at times.

The participants who answered no to question three (27%) in regards to smart phones and public announcements systems being an efficient way to communicate had some additional comments regarding their answer. "Service is not always reliable, especially in larger hospitals." "No service in most ORs, overhead paging system plays in halls and can't hear in ORs." "Some cell phones do not have service in areas of hospital and will not allow for text/calls." All participants who answered no to question three were SRNAs. This may be due to the cellular device policy or individuals having a personal cellular service that is not reliable within these facilities. The CRNAs and anesthesiologists may have a cellular service that is more reliable due to this being their home and current place of work. The SRNAs may have cellular services from out of state.

Clinical Question Response

Are the clinicians of the anesthesia group satisfied with the current level of communication among anesthesia providers; are they willing to be informed of the advances in electronic communication and are they willing to accept a practice change? These questions were answered directly through the survey. Are the anesthesia providers satisfied with the current level of communication? Of the participants, 54.5% were not satisfied with the current level of communication. Are they willing to be informed of the advances in electronic communication? Eighty-five percent of the participants answered

yes in regards to this question. Are the providers willing to accept a practice change? Seventy-nine percent stated that they would be willing to accept a practice change.

This information was positive and demonstrates an atmosphere of learning and willingness to change. If presented correctly, electronic communication for anesthesia group one may potentially be improved. However, it is imperative to address the obstacles and limitations to implementing these devices and further research may be required.

CHAPTER V – SUMMARY

Limitations

This nursing capstone project relied upon the willingness of anesthesia providers to participate. Requesting the anesthesia providers to complete the survey was met with a modest amount of reluctance. Further limitations included a lower sample size due to the inability to properly coordinate survey disbursement. Electronic survey provided to individual's email may have been an easier approach for the researcher and the participants. However, multiple anesthesia providers when asked what they prefer between electronic and paper surveys, stated they often ignore electronic request for participation.

Future Directions

Additional research regarding electronic communication for anesthesia group one is needed. The need for advancement is there, if only to include the SRNAs into the communication loop. Previous research showed that ECDs enhance communication among healthcare professionals and since the SRNAs have been effectively removed from communication, it is important in the future to address this topic.

Conducting a trial with ECDs at one of the anesthesia group one facilities may be beneficial. This trial could be conducted over the course of a week, consisting of six to eight hour workdays. For this trial, the ECDs used could be two-way walkie-talkies supplied by the researcher. Once the study period is complete, the providers whom participated within the trial would be given a survey in order to compare the effects of the ECDs to the use of smart phones. A seven point Likert scale could be utilized to assess the participant's views of the ECDs. The categories assessed could be *communication*,

efficiency, *time saved*, and *stress levels*. A Likert scale could be utilized for the survey and the options could range from 1 (greatly diminished), 2 (moderately diminished), 3 (slightly diminished), 4 (no change), 5 (slightly improved), 6 (moderately improved), and 7 (greatly improved). After the surveys are completed, the data could be analyzed to determine the outcome.

Conclusion

ECDs improve communication through increases in speed and efficiency (Wu et al., 2012). There is a need for an electronic communication change for anesthesia group one as evidenced by the 54.5% of participants stating that they are not satisfied with the current level of communication between anesthesia providers. All of the providers who are not satisfied are SRNAs. Since SRNAs are anesthesia providers in training, it is imperative that they be able to communicate with and quickly receive help from the experiences anesthesia providers (CRNAs and anesthesiologists). The purpose is to remove a potential element of error in the form of non-communication in order to avoid patient harm. Since healthcare is greatly focused upon standards in improving patient health, satisfaction and avoiding patient harm it is logical to make attempts to improve practice in areas that have been shown through research to improve upon these standards.

APPENDIX A – Literature Matix

AUTHORS(YEAR)	DESIGN	FRAME WORK	SAMPLE	FINDINGS	CONCEPT
Richardson and Ash (2008)	Qualitative	Grounded Theory, Multiple Perspectives Approach	26 staff members including IT Members, Staff Nurses, and Nurse Managers.	The results were presented through two major themes (communication access and control) created with grounded theory analysis. The conclusion was that the staff had become dependent upon ECDs and would not want to work without them. However, several reservations or complaints were made about the system.	Obstacles.
Richardson and Ash (2009)	Qualitative	Grounded Theory Methodology	26 participants (staff nurses, nurse managers, and IT staff).	The authors discovered five major themes by analyzing the data using grounded theory methodology. The themes include: Communication Access, Control, Training, Organizational Change, and Environment and Infrastructure.	Obstacles.

Richardson, Shah-Hosseini, Fiadjoe, and Ash (2010)	Quantitative	Constant Comparative Method	18 pediatric surgical staff members interviewed. 2 anesthetists observed.	Three new themes with subthemes were reported; technical control, choosing communication channels, and reliability. They found that staff desire to be interconnected but not to be interpreted, which reflects a communication balancing act. They propose that most issues with the "balancing act" can be alleviated through proper training and education.	Obstacles.
de Grood, Wallace, Friesen, White, Gilmour, and Lemaire (2012)	Mixed Study (Qualitative and Quantitative)	Analytic Method Statistical Method	Qualitative n = 11 Quantitative n = 37= 26, Intervention n = 49.	Qualitative produced three themes (Improved Team Communication, Improved Work Efficiency, and Improved Quality of Patient Care). Quantitative research showed that 72% of the team members felt that they communicated more effectively with wireless communication devices than they did without.	Speed and Efficiency.
Breslin, Greskovich, and Turisco (2004)	Mixed-method study	None.	Staff from two 32-bed units, one unit used Vocera and the other unit did not.	With the use of Vocera®, one nursing unit saved over 3400 hours over a year's time which is equivalent to 1.7 full-time employees. This results in an average cost savings of $74,000/unit/year. Results also indicated that the communication method employed for the non-Vocera® floor indicated 15% of nurses felt that communication had a positive impact on the quality of patient care when compared to 65% of nurses on the Vocera® unit.	Speed and Efficiency.

Vandenkerhof, Hall, Wilson, Gay, and Duhn (2009)	Mixed-method study	Theory of Planned Behavior	55 staff members of a 38-bed general surgical unit	79% of staff reported that the Vocera® improved workflow, and 97% of staff felt that Vocera® eased communication and was a great assistance to locating people or supplies.	Speed and Efficiency.

APPENDIX B – Doctor of Nursing Essentials

Doctor of Nursing Essentials		How the Essential is Achieved
I.	Scientific Underpinnings for Practice	By using nursing sciences, which include knowledge in the fields of biophysical, psychosocial, analytical, organizational, and ethical sciences in order to complete this nursing capstone project.
II.	Organizational and Systems Leadership for Quality Improvement and Systems Thinking	The idea of this nursing capstone project is to create a system change within local hospitals. To change current practice and improve function.
III.	Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This essential was met through the development of an evidence review for this nursing capstone project. Analytical methods and critical appraisal were utilized to eliminate undesirable literature.
IV.	Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	The concept behind this nursing capstone project is to improve communication among anesthesia providers. In order to accomplish this, a new technology must be implemented.
V.	Health Care Policy for Advocacy in Health Care	The intended purpose of this nursing capstone project is to create a new health care policy for Hattiesburg Clinic regarding electronic communication.
VI.	Interprofessional Collaboration for Improving patient and Population Health Outcomes	The nursing capstone project relies upon the collaboration between anesthesia providers in order to be successful. It addresses communication between anesthesiologists, CRNAs, and SRNAs. Improving communication among anesthesia providers improves patient health outcomes.
VII.	Clinical Prevention and Population Health for Improving the Nation's Health	Breakdown in communication among anesthesia providers can result in patient harm. This project aims to improve communication by removing barriers. Successfully implemented, electronic communication improves speed and efficiency leading to improved patient outcomes.
VIII.	Advanced Nursing Practice	The analyze of evidence, the synthesize of data, and the implementation of electronic communications are all expected of the advanced practice nurse.

APPENDIX C – SWOT

SWOT	
Strengths: • Staff are well trained and offer a wealth of experience. • Willingness of the anesthesia providers to cooperate. • Interprofessional collaboration among anesthesia personnel.	**Weakness:** • Cannot control all variables within the experimental design. • Survey results rely upon the diligence and honesty of the participants. • True implementation of ECDs will be of significant monetary cost to the facility.
Opportunities: • Change in practice for the Hattiesburg Clinic. • Improvement in health care for patients. • Improvement in speed and efficiency resulting in an increase in staff morale.	**Threats:** • Rejection of the concept. • Individuals unwilling to accept a practice change. • Individuals unwilling to participate in the surveys.

APPENDIX D – Logic Model

Inputs	**Outputs**		**Outcomes - Impact**		
	Activities	***Participation***	***Short***	***Medium***	***Long***
Equipment Time Money Technology	Interview Survey	CRNAs SRNAs Anesthesiologists	Learning Improved Speed & Efficiency Increased Knowledge	Practice Policy Change Improved patient satisfaction Decision-making	Change in practice Improved time management resulting in decreased economic cost Improved conditions
Risk Factors: Participants unwilling to offer accurate and honest opinions.			**Assumptions:** The implementation of walkie-talkies will increase speed and efficiency.		

APPENDIX E – Anesthesia Group Two Survey

Date: _____

This interview survey aims to explore the advantages and disadvantages of using walkie-talkies to communicate among anesthesia providers.

Please read the questions carefully and provide clear and complete answers.

1. How often would you say that the walkie-talkies are utilized on a daily basis?

_____

2. What would you say are the advantages to using the walkie-talkies?

_____

_____

3. What would you say are the disadvantages to using the walkie-talkies?

_____

_____

4. Can you describe a scenario in which walkie-talkie use prevented a poor patient outcome?

_____

_____

5. Can you describe a scenario in which walkie-talkie use caused a patient harm?

_____

_____

6. Would you recommend the use of walkie-talkies for anesthesia communication? ____

APPENDIX F – Anesthesia Group One Survey

Circle One: Anesthesiologist CRNA SRNA

Date: _____

The purpose of this survey is to explore your satisfaction with the current devices used for communication and your willingness for change.

Please read the questions carefully and circle an answer.

1. Are you satisfied with the current level of communication between anesthesia providers?
   Yes No Not Sure
   Comments: _____

   _____
2. Are the current devices reliable?
   Yes No Not Sure
   Comments: _____

   _____
3. Do you feel that the use of smart phones and public announcement systems provide an efficient way to communicate among anesthesia providers?
   Yes No Not Sure
   Comments: _____

   _____
4. Would you be willing to listen to information regarding advances in electronic communication?
   Yes No Not Sure
   Comments: _____

   _____
5. Would you be willing to accept a practice change?
   Yes No Not Sure
   Comments: _____

   _____

APPENDIX G – IRB Approval

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16080506
PROJECT TITLE: Electronic Communication Among Anesthesia Providers
PROJECT TYPE: New Project
RESEARCHER(S): Joseph Wells
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Advanced Nursing Practice/Nurse Anesthesia Program
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Exempt Review Approval
PERIOD OF APPROVAL: 08/30/2016 to 08/29/2017
Lawrence A. Hosman, Ph.D.
Institutional Review Board

APPENDIX H – Letter of Support

[redacted]

June 13th, 2016

Richard Williams
215 Marion Ave.
McComb, MS 39648
(601) 249-5500

RE: Joseph Wells Request for Letter of Support

I am an administrator at S[redacted] Medical Center in [redacted], Mississippi. I am offering this letter of support of the SRNA doctoral student, Joseph Wells, in his Capstone project titled Electronic Communication Among Anesthesia Providers.

I understand that Joseph Wells, is a doctoral student in the nurse anesthesia program at the University of Southern Mississippi who is planning to graduate in December of 2016. This letter of support will be included in the University of Southern Mississippi IRB application. I understand that open participation will be to presented to anesthesia providers practicing at this facility. There is no compensation for their participation.

I understand the planned dates for his research are from August 1st, 2016 to December 1st, 2016 after USM IRB approval is received. His chair contact information is Dr. Marjorie Geisz-Everson at marjorie.geiszeverson@usm.edu and at ([redacted]

I understand that participation is completely anonymous and voluntary. If anesthesia providers at this facility may choose not to participate or withdraw from the study at any time, there will be no penalty.

I am looking forward to hearing the results of research and impact on clinical practice.

Sincerely,

[redacted]

Richa[redacted]r

1

APPENDIX I – Letter of Support

[redacted]

July 8th, 2016

[redacted]

RE: Joseph Wells Request for Letter of Support

I am the Chief Certified Registered Nurse Anesthetist in practice at [redacted] Regional Medical Center in [redacted] Mississippi. I am offering this letter of support of the SRNA doctoral student, Joseph Wells, in his Capstone project titled Electronic Communication Among Anesthesia Providers

I understand that Joseph Wells, is a doctoral student in the nurse anesthesia program at the University of Southern Mississippi who is planning to graduate in December of 2016. This letter of support will be included in the University of Southern Mississippi IRB application. I understand that open participation will be presented to anesthesia providers practicing at this facility. There is no compensation for their participation.

I understand the planned dates for his research are from August 1st, 2016 to December 1st, 2016 after USM IRB approval is received. His chair contact information is Dr. Marjorie Geisz-Everson at marjorie.geiszeverson@usm.edu and at [redacted].

I understand that participation is completely anonymous and voluntary. If anesthesia providers at this facility choose not to participate or withdraw from the study at any time, there will be no penalty.

I am looking forward to hearing the results of research and impact on clinical practice.

Sincerely,

[redacted]

[redacted]ry, Chief Certified Nurse Anesthetist

[redacted]

RE: Joseph Wells Request for Letter of Support

I am the Chairman of Anesthesiology and Chief Medical Officer at [redacted] in [redacted], Mississippi. I am offering this letter of support of the SRNA doctoral student, Joseph Wells, in his Capstone project titled Electronic Communication Among Anesthesia Providers.

I understand that Joseph Wells is a doctoral student in the nurse anesthesia program at the University of Southern Mississippi who is planning to graduate in December of 2016. This letter of support will be included in the University of Southern Mississippi IRB application. I understand that open participation will be presented to anesthesia providers practicing at this facility. There is no compensation for their participation.

I understand the planned dates for his research are from August 1st, 2016 to December 1st, 2016 after USM IRB approval is received. His chair contact information is Dr. Marjorie Geisz-Everson at marjorie.geiszeverson@usm.edu and at (504) 391-1758.

I understand that participation is completely anonymous and voluntary. If anesthesia providers at this facility may choose not to participate or withdraw from the study at any time, there will be no penalty.

I am looking forward to hearing the results of research and impact on clinical practice.

Sincerely,

[redacted]

Joe Campbell,
Chairman of Anesthesiology and Chief Medical Officer

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